

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method of controlling an assembly line, comprising the steps of:
 - providing an article assembly line;
 - designating a first processing station, on the assembly line, ~~an upstream processing station and a downstream processing station~~;
 - providing an entry signal to be representative of an arrival of an article in the first processing station and/or an exit signal to be representative of a departure of the article from the first processing station;
 - delivering a first article to the ~~upstream~~ first processing station;
 - providing a designated processing function in the first processing station;
 - monitoring ~~an upstream~~ the designated processing function on the first article within the ~~upstream-first~~ processing station over a monitoring period according to the entry signal and/or the exit signal;
 - and if, ~~the upstream~~ when the designated processing function in the ~~upstream~~ first processing station on the first article is not ~~complete~~ completed within the monitoring period:
 - issuing a signal to an operator in the ~~upstream~~ first processing station

that the ~~upstream~~ designated processing function on the first article is not complete;

~~—extending the first processing station along the assembly line the length of the upstream processing station to allow the upstream operator an additional length portion of the assembly line more time to complete the designated upstream processing function;~~

~~- monitoring the upstream~~ designated processing function in the extended upstream ~~first~~ processing station;

~~- and further, when if the upstream~~ designated processing function on the first article is not complete in the extended first processing station;

~~- associating a label with the first article for downstream remedial attention;~~

~~- advancing the first article downstream~~ along the assembly line from the extended upstream ~~first~~ processing station;

~~—advancing a second article to the upstream processing station for the upstream processing function;~~

~~—and if the upstream processing function on the first article is complete;~~

~~—advancing the first article downstream from the upstream processing station or the extended upstream processing station;~~

~~—advancing a second article to the upstream processing station.~~

2. (Cancelled)

3. (Cancelled)

4. (Currently Amended) A method as defined in claim 1, wherein the extended ~~upstream~~first processing station at least partially overlaps the ~~downstream~~ a second processing station along the assembly line.

5. (Currently Amended) A method as defined in claim 1, wherein the ~~upstream and downstream stations are~~ first processing station is immediately adjacent a second processing station ~~one another~~, the designating step including the step of shortening the length of the ~~second downstream~~ processing station as a result of extending the ~~upstream~~first processing station.

6. (Currently Amended) A method as defined in claim 4, further including the step of issuing one or more signals to an operator in the first upstream processing station and issuing one or more signals to an operator in the second downstream processing station, the one or more signals indicating that the designated upstream processing function is not complete.

7. (Currently Amended) A method as defined in claim 6, wherein the same signal is issued to both the first and second upstream and downstream operators.

8. (Currently Amended) A method as defined in claim 6, wherein the signal is visible and/or audible by both the first and second upstream and downstream operators.

9. (Currently Amended) A method as defined in claim 6₁ wherein the signal is conveyed, or encoded on a carrier signal which is conveyed, over a wired and/or wireless data link ~~with the operator~~.

10. (Currently Amended) A method as defined in claim 1₁ wherein the extended first upstream processing station is returned to its original geometric size when the designated upstream processing function on the first article is either complete or when the first article is advanced beyond the first processing station along the assembly line downstream.

11. (Currently Amended) A method as defined in claim 1, wherein the assembly line is a vehicle assembly line.

12. (Currently Amended) A method as defined in claim 11₁ wherein the first upstream processing station is a torque theatre.

13. (Currently Amended) A method as defined in claim 12₁ wherein the monitoring step includes counting the number of correct torque functions executed in the torque theatre.

14. (Currently Amended) A method as defined in claim ~~13~~12, wherein the step of monitoring includes the steps of providing a torque tool and sensing the operation of the torque tool to determine when the torque tool is operating within a first set of predetermined conditions to register a correct torque function and to

determine when the torque tool is operating within a second set of predetermined conditions to register an incorrect torque function.

15. (Currently Amended) A method as defined in claim 14, wherein the monitoring step of monitoring includes the step of providing a map of torque targets to be hit during a predetermined torque sequence.

16. (Original) A method as defined in claim 15, wherein the step of monitoring includes the step of recording the location of the torque tool relative to the map, and storing the location of the torque tool and a predetermined torque condition of the torque tool at each location.

17. (Cancelled)

18. (Currently Amended) An assembly line, comprising:

- a first processing station and a second processing station;
- conveyor means for conveying a plurality of articles along the assembly line and through at least one of the processing stations;
- at least one first processing device means for processing an article delivered to the first processing station;
- a first entry signal generating means to issue a first entry signal to be representative of an arrival of an article in the first processing station,
- a first exit signal generating means to issue a first exit signal to be representative of a departure of the article from the first processing station;

- first process monitoring means for monitoring ~~the first processing device~~
according to a first processing function over a first monitoring period according to the
first entry signal and/or the first exit signal;

- at least one second processing means device for processing an article
delivered to the second processing station;

- a second entry signal generating means to issue a second entry signal to be
representative of an arrival of an article in the second processing station,

- a second exit signal generating means to issue a second exit signal to be
representative of a departure of the article from the second processing station;

- second process monitoring means for monitoring ~~the second processing~~
~~device according to a second processing function over a second monitoring period~~
according to the second entry signal and/or the second exit signal;

- master monitoring means, communicating with each of the first and second
process monitoring means for monitoring the assembly line;

- each of the first and second process monitoring means being operable to
determine if when the corresponding first and second processing functions have
been completed; and if ~~the~~ when either process monitoring means determines that
the corresponding first or second processing function has not been completed in the
corresponding first or second monitoring period, the corresponding process
monitoring means is operable to issue a signal to an operator in the corresponding
processing station that the corresponding processing function is not complete;

- and where either processing function is not complete, the corresponding
process monitoring means is being operable to extend the length of the assembly
line for the corresponding processing station to form an extended processing station

for the operator to complete the corresponding processing function;

- the corresponding process monitoring means being operable to monitor the processing function in the extended processing station over the corresponding first or second monitoring period according to the corresponding entry signal and/or the corresponding exit signal; and if when the corresponding process monitoring means determines that the processing function on the ~~first~~ article in the extended processing station is still not complete; then the process monitoring means is being operable to cause a label to be associated with the corresponding article for remedial attention.

19. (Currently Amended) A method of controlling an assembly line, comprising:

- a step for providing an article assembly line;
- a step for designating a first processing station, on the assembly line, ~~an upstream processing station and a downstream processing station~~;
- a step for providing an entry signal to be representative of an arrival of an article in the first processing station and/or an exit signal to be representative of a departure of the article from the first processing station;
- a step for delivering a first article to the ~~upstream~~ first processing station;
- a step for providing a designated processing function in the first processing station;
- a step for monitoring the designated processing function on the first article within the first processing station over a monitoring period according to the entry signal and/or the exit signal; ~~an upstream processing function on the first article~~

~~within the upstream processing station;~~

~~- and if the upstream processing function in the upstream processing station on a first article is not complete~~ when the designated processing function in the first processing station on the first article is not completed within the monitoring period:

~~- a step for issuing a signal to an operator in the first processing station~~ that the designated processing function on the first article is not complete;

~~- a step for extending the first processing station along the assembly line to allow the operator an additional length portion of the assembly line to complete the designated processing function;~~

~~- a step for monitoring the designated processing function in the~~ extended first processing station;

~~- and when the designated processing function on the first article is not complete in the extended first processing station;~~

~~- a step for associating a label with the first article for remedial attention;~~

~~- a step for advancing the first article along the assembly line from the extended first processing station.~~

~~- a step for issuing a signal to an operator in the upstream processing station that the upstream processing function on the first article is not complete;~~

~~- a step for extending the length of the upstream processing station to allow the upstream operator more time to complete the upstream processing function;~~

~~- a step for monitoring the upstream processing function in the~~

~~extended upstream processing station;~~

~~– and if the upstream processing function on the first article in the~~

~~extended upstream processing station is not complete;~~

~~– a step for associating a label with the first article;~~

~~– a step for advancing the first article downstream from the~~

~~extended upstream processing station;~~

~~– a step for advancing a second article to the upstream~~

~~processing station for the upstream processing function;~~

~~– and if the upstream processing function on the first article is complete;~~

~~– a step for advancing the first article downstream from the~~

~~extended upstream processing station;~~

~~– a step for advancing a second article to the upstream~~

~~processing station for the upstream processing function.~~

Claims 20-28 (Cancelled)

29. (New) A processing system, comprising:

- a first processing station positioned on a processing line;

- a conveyor for conveying a plurality of articles along the processing line and through the first processing station;

- at least one first processor for processing an article delivered to the first processing station according to a first processing function;

- a first entry signal generator to issue a first entry signal to be representative of an arrival of an article in the first processing station,

- a first exit signal generator to issue a first exit signal to be representative of a departure of the article from the first processing station;

- process monitor for monitoring the first processing function over a monitoring period according to the entry signal and/or the exit signal;

- the process monitor being operable to determine when the first processing function has been completed, and when the process monitor determines that the corresponding first processing function has not been completed, the process monitor being operable:

- to issue a signal to an operator in the first processing station that the corresponding processing function is not complete; and

- to extend the length of the processing line corresponding to the first processing station to form an extended first processing station for the operator to complete the first processing function;

- the process monitor being operable to monitor the first processing function in the extended first processing station over a monitoring period according to the entry signal and/or the exit signal; and when the process monitor determines that the first processing function in the extended first processing station is still not complete, the process monitor being operable to cause a label to be associated with the corresponding article for remedial attention.

30. (New) A system as defined in claim 29, wherein the extended first processing station at least partially overlaps a second processing station.

31. (New) A system as defined in claim 30, the process monitor being

operable to shorten the length of the processing line for the second processing station according to the extended first processing station.

32. (New) A system as defined in claim 31, the process monitor being operable to issue one or more signals to an operator in the first processing station and/or one or more signals to an operator in the second processing station, the one or more signals indicating that the designated processing function is not complete.

33. (New) A system as defined in claim 32, wherein the signal is visible and/or audible by both the first and second operators.

34. (New) A system as defined in claim 32, wherein the signal is conveyed, or encoded on a carrier signal which is conveyed, over a wired and/or wireless data link.

35. (New) A system as defined in claim 29, the process monitor being operable to return the extended first processing station to its original size when the first processing function is either complete or when the first article is advanced beyond the first processing station.

36. (New) A system line as defined in claim 29, wherein the first processing station is a torque theatre.

37. (New) A system line as defined in claim 36, wherein the process monitor

is operable to count a number of correct torque functions executed in the torque theatre.

38. (New) A system line as defined in claim 37, the first processing station including a torque tool, the process monitor being operable to sense the operation of the torque tool to determine when the torque tool is operating within a first set of predetermined conditions to register a correct torque function and to determine when the torque tool is operating within a second set of predetermined conditions to register an incorrect torque function.

39. (New) A system line as defined in claim 38, further comprising a display to provide a graphical representation of a map of torque targets to be hit during a predetermined torque sequence.

40. (New) A system line as defined in claim 39, the display being operable to record the location of the torque tool relative to the map, further comprising a data storage unit for storing the location of the torque tool and a predetermined torque condition of the torque tool at each location.

41. (New) A system as defined in claim 29, wherein the processing line is operable to travel along a flow path in a predetermined direction.

42. (New) A system as defined in claim 29, wherein the processing line is operable to travel along a flow path in more than one predetermined direction.

43. (New) A method of monitoring the productivity of an operator in a processing station in an assembly line, comprising:

- providing an article assembly line;
- designating a first processing station on the assembly line;
- providing an entry signal to be representative of an arrival of an article in the first processing station and/or an exit signal to be representative of a departure of the article from the first processing station;
- delivering a first article to the first processing station;
- providing a designated processing function in the first processing station;
- monitoring the designated processing function on the first article within the first processing station over a monitoring period according to the entry signal and/or the exit signal;
- and when the designated processing function in the first processing station on the first article is not complete within the monitoring period:
 - issuing a signal to an operator in the first processing station that the designated processing function on the first article is not complete;
 - extending the first processing station along the assembly line to allow the operator an additional length portion of the assembly line to complete the designated processing function;
 - monitoring the designated processing function in the extended first processing station;
 - and when the designated processing function on the first article is not complete;

- associating a label with the first article for remedial attention;
- advancing the first article along the assembly line from the extended first processing station;
- recording an incomplete first processing function event.

44. (New) A method of controlling an assembly line, comprising the steps of:

- providing an article assembly line;
- designating a first processing station on the assembly line;
- providing an entry signal to be representative of an arrival of an article in the first processing station and/or an exit signal to be representative of a departure of the article from the first processing station;
- delivering a first article to the first processing station;
- providing a designated processing function in the first processing station;
- monitoring the designated processing function on the first article within the first processing station over a monitoring period according to the entry signal and/or the exit signal;
- and when the designated processing function in the first processing station on the first article is not complete within the monitoring period:
 - issuing a signal to an operator in the first processing station that the designated processing function on the first article is not complete;
 - extending the first processing station along the assembly line to allow the operator an additional length portion of the assembly line to complete the designated processing function, while advancing a second article to the first processing station for the designated processing function, thereby

temporarily resulting in both the first and second articles being present in the first extended processing station;

- monitoring the designated processing function in the extended first processing station;

- and when the designated processing function on the first article is not complete;

- associating a label with the first article for remedial attention;
 - advancing the first article along the assembly line from the extended first processing station.